STATE OF ALASKA

William A. Egan, Governor

Annual Progress Report for

LIFE HISTORY INVESTIGATIONS OF NORTHERN PIKE IN THE TANANA RIVER DRAINAGE

by

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RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-3 *Name:* Sport Fish Investigations of Alaska.

Study No.: R-III *Study Title:* **Life History Investigations of Northern Pike in the Tanana River Drainage.**

Period Covered: July 1, 1970 to June 30, 1971.

ABSTRACT

During 1970, 378 northern pike, Esox lucius Linnaeus, were tagged in the Minto Flats. Thirty-six were recaptured.

Test netting showed pike are more abundant in the northwestern and southeastern sections of Minto Flats.

Creel census data showed a decrease in fishing effort and catch in 1970 compared to 1969. Subsistence fishermen took approximately 800 pike.

Some pike spawning grounds were located and their charactersitics assessed. Spawning occurred from approximately May 10 to June 15.

Age and growth studies utilizing scales and vertebrae from pike were begun. Aging by vertebrae appears to be more accurate than the scale method.

Water temperatures and chemistry were monitored during the summer in Minto Flats.

Food habit studies showed that fish were the most important food item, followed by invertebrates.

RECOMMENDATIONS

1. A statistically based creel census should be continued and arranged so the entire Minto Flats can be censused. The subsistence fishery should be intensely monitored.

2. The tagging program should be continued to further define winter and summer movements.

3. Major spawning areas should be located, delimited, and assessed. Fecundity studies should be initiated.

4. Attempts should be made to estimate pike populations in various areas of Minto Flats.

5. Food habits studies should be continued.

6. Surveys of other pike waters throughout the Tanana River drainage should be initiated.

TECHNIQUES USED

Northern pike were captured using graduated mesh gill nets, four- and five-inch stretched mesh gill nets, fyke nets, beach seines, and sport angling gear. All fish taken alive were weighed, measured, and tagged. Pike movements were determined by tagging and recovery. Floy yellow plastic dart tags were used and recaptures were made by Department personnel and subsistence and sport fishermen.

Creel census information was collected by interviewing anglers. Aerial boat counts were made and correlated with ground counts. Subsistence fishery estimates were made by interviewing fishermen and counting nets and fish.

Spawning grounds were located by foot and boat.

Scales, sections of dorsal fin rays, and the first four to eight vertebrae were taken for age determination. Pike were aged using scales and vertebrae. Scales were mounted between glass slides and read with a microprojector. Vertebrae were cleaned, dried, separated, placed in a clearing agent, and read with a binocular microscope.

Water temperatures were taken with hand and electric thermometers. Water chemistry was determined with a Hach Model AC-36-WR test kit. Some water samples were also analyzed by the Federal Water Pollution Control Administration, Alaska Water Laboratory.

Job R-III-E *Limnological, Productivity, and Food Habits Study of Minto Flats Pike.*

Objectives

1. To compile data on the chemical, physical, and biological parameters of the various waters comprising the Minto Flats.

2. To study the food habits of Minto Flats pike.

Limnology

Water temperatures were monitored in Minto Flats from May 6, to September 25, 1970. At this time, ice was still in the main rivers but was largely absent from lakes and sloughs. Water temperatures varied from 33°F (0.6°C) at the open edges of the rivers to 40°F (4.4°C) in the ice-free shallows of rivers and sloughs. Ice had gone out completely by May 13 and the rivers had warmed to 42°F (5.6°C). The temperatures on the Tolovana, Tatalina, and Chatanika rivers rose abruptly in the first seven to nine days following breakup, then continued to rise gradually to a maximum of 62° - 64°F (16.7° - 17.8°C) in mid-July.

Maximum and mean temperatures of the three rivers were as follows:

	Temperature in °F and (°C)			
	Summer			
	Max. Temp.		Mean Temp.	
Chatanika River	62	(16.7)	51.3	(10.7)
Tatalina River	62	(16.7)	52.8	(11.6)
Tolovana River	64	(17.8)	52.4	(11.3)

A maximum of 68°F (20.0°C) was recorded on June 24 in Minto Lake and August 1 in Windy Lake.

Over the summer, the Chatanika River watershed is the collector of the bulk of the run-off into the Flats. The river was high and turbid with occasionally much debris.

Water quality samples were taken in the major streams and standing waters of Minto Flats, as well as some other large lakes of the Tanana River drainage. Table 7 summarizes this information.

TABLE 7 Water Quality Data, Minto Flats Waters and Tanana Drainage Lakes, 1970.

Water	Date	Water Temp. °F	D.O. (ppm)	CO_2 (ppm)	pH	Hardness (ppm)	Acid Free (ppm)	Acid Tot. (ppm)	Tot. Alkalinity Phen. (ppm)	Tot. Alkalinity M.O. (ppm)
Goldstream Creek (mouth)	7/15	63.0	8.5	12.5	8.8	--	-	--	--	85.5
Chatanika River (12 mi. above Goldstream Creek)	7/15	60.0	10.5	7.5	8.7	--	-	--	--	85.5
Chatanika River (above mouth)	7/17	62.0	8.5	12.5	7.7	85.5	0	29.1	0	102.6
Tolovana River (above mouth of Chatanika River)	7/16	64.0	8.0	12.5	7.3	102.6	0	11.5	0	85.5
	7/31	61.5	8.5	10.0	8.4	85.5	-	11.5	0	102.6
Tatalina River (above mouth)	7/17	58.0	10.5	12.5	8.3	85.5	0	39.3	0	85.5
Minto Lake	7/29	64.0	10.0	5.0	8.8	85.5	0	0	17.1	102.6
East Twin Lake	7/22	62.0	10.0	5.0	8.7	51.3	0	5.6	17.1	102.6
West Twin Lake	7/23	62.0	10.5	6.5	8.7	51.3	0	5.6	17.1	85.5
Wien Lake	7/24	60.0	9.5	5.0	8.0	51.3	0	5.6	17.1	51.3
Quartz Lake	8/ 9	61.5	9.0	15.0	8.8	205.2	0	11.3	34.2	256.5

Hardness, free acid, total acid, and total alkalinity are given in parts per million of calcium carbonate.

Water quality sampling was also conducted during the winter of 1970-71 at several locations in the Minto Flats. These data are presented in Table 8. Dissolved oxygen levels in the principal Minto Flats rivers dropped rapidly following freezeup in late September. This reduction in oxygen may trigger the winter outmigration of Minto Flats fish.

TABLE 8 Winter Water Chemistry, Minto Flats, 1970-1971.

Date	Location	Snow Depth (In.)	Ice Thickness (In.)	D.O. (ppm)	CO_2 (ppm)	Alk. (ppm)	pH
11/ 1/70	Windy Lake*	4.5	18	9.0	--	-	6.8
11/ 1/70	Tolovana River**	10	11	2.5	--	-	6.6
11/19/70	Chatanika River***	8	5.5	2.5	12.5	86	6.6
11/19/70	Tolovana River (bottom)****	7	8.5	2.0	12.5	137	6.6
	Tolovana River	-	-	1.0	15.0	137	6.6
3/26/71	Tolovana River Swanneck Slough confluence	15	38	4.5	25.0	102	6.8
3/26/71	Tolovana River (mouth)	15	28	1.5	35.0	120	8.7
4/26/71	C.O.D. Lake	0	35	1.5	20.0	120	6.7

*Sample taken just off bottom.
**At mouth of Rock Island Slough.
***At mouth of Tatalina River.
****At mouth of Chatanika River.

Food Habits

Stomachs of 162 pike captured in Minto Flats rivers and interconnected waters were examined. Eighty-one (50%) of the stomachs were empty. The fish ranged in length from 36.5 - 106.7 cm and in weight from 0.75 - 25.75 pounds. Table 9 summarizes food habits of Minto Flats pike in 1970.

TABLE 9 Stomach Contents of 81 Northern Pike Taken in Minto Flats, 1970.

	Incidence in Stomachs	% Occurrence
Fish:		
Least cisco (C. sardinella)	7	8.6
Humpback whitefish	2	2.5
Unidentified whitefish species	29	35.8
Pike	3	3.7
Burbot (Lota lota leptura)	1	1.2
Fish remains	16	19.8
Total	58	71.6
Vertebrates:		
Mice	1	1.2
Shrews	1	1.2
Total	2	2.4
Invertebrates:		
Mosquitoes (Culicidae)	2	2.5
Shrimp (Gammarus sp.)	12	14.8
Snails (Gyralus sp.; Lymnaea sp.)	1	1.2
Odonata Naiads	4	5.0
Dytiscids (Dytiscidae)	4	5.0
Stone fly nymphs (Plecoptera)	1	1.2
Leech (Annelida)	1	1.2
Total	25	30.9

Fish were the main item of diet, occurring in 71.6% of the stomachs containing food. Alt (1968) found that fish constituted 62.0% of the Minto Flats pike diet. Novikov (1966) found that fish constituted 100% of the pike diet of Kolyma River, USSR.

In 1970, vertebrates other than fish were an insignificant food item. Alt (1968) found that shrews and ducklings were eaten by 6.9% of those fish with food in their stomachs. He also stated (personal communication) that in 1969 mice were a large part of the pike's stomach contents. These animals were very abundant that year. In 1970, numbers apparently decreased as none were seen. No ducklings were found in pike stomachs in 1970 even though Minto Flats is an important waterfowl rearing area.

Stomachs from 30 C.O.D. Lake pike were also examined. This lake is landlocked, except during extremely high water periods. The pike fed predominately on Odonata naiads. Snails, clams, shrimp, and mayfly nymphs made up a smaller part of the diet. Fish remains, tentatively identified as burbot or blackfish, Dallia pectoralis, were found in 6 of the 30 stomachs. These fish remains ranged from approximately 50 - 70 cm in length. Table 10 summarizes data from C.O.D. Lake pike stomachs.

TABLE 10 Food of 30 Northern Pike Taken at C.O.D. Lake, Minto Flats, June 22, 1970.

Food Item	Incidence in Stomachs	% Occurrence
Fish (burbot, blackfish)	6	20.0
Odonata naiads	21	70.0
Ephemeroptera nymphs	3	10.0
Hemiptera larvae	1	3.3
Shrimp (Gammarus sp.)	11	36.7
Clams	1	3.3
Snails	3	10.0
Mollusc egg capsules	4	13.3
Empty	3	10.0

Pike are quite adaptable and can exist on a wide variety of foods in the absence of fish prey. The pike taken in C.O.D. Lake were in good condition. However, these pike, all of age class VI were somewhat smaller than other Minto Flats pike of the same age.

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